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### **REMARKS**

#### **The Invention.**

The present invention provides a process for liquefying starch using an alpha-amylase enzyme obtained from *Bacillus acidocaldarius* species at a low pH without the need to add thermostabilizing agents such as calcium.

#### **Status of the Application.**

Claims 1, 2, 6-18, 21-34 and 37-51 are pending in the application. Applicants reserve the right to file further continuation applications on any subject matter disclosed in the instant application or on the subject matter of any previously or presently cancelled claim. Claims 1, 22, 33, 38, and 43-45 have been amended to more clearly state what Applicants believe is the invention. Claims 53-61 are new and are directed to a process of for producing glucose from starch. The new claims find support throughout the specification as filed, especially Example 8. Applicants assert new matter has not been introduced by the amendment.

The specification has been amended to correct a typographical error in a formula. One skilled in the art would recognize the error. Indeed, it is the same formula as provided in a reference cited by the Examiner. Applicants assert new matter has not been introduced by the amendment.

#### **Rejection under 35 U.S.C. §102(b)/103 -**

Product by process claims 46-51 were rejected under 35 U.S.C. §102(b) as being anticipated by or, in the alternative under 35 U.S.C. §103 (a) as obvious over Antrim *et al.* (US Pat. No. 5,322,778). Applicant respectfully traverses the rejection. 35 U.S.C. §102(b).

It is well-settled law that to anticipate a claim the prior art reference must contain each and every element within the four corners of the document. Thus, Applicants submit that there can be no anticipation unless all of the same elements of the invention are found within the four corners of a single reference. *Lewmar Marine, Inc. v. Bariant, Inc.*, 827 F.2d 744, 747, 3 USPQ2d 1766, 1767-68 (Fed. Cir. 1987). A reference that merely contains substantially the same elements or only

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broadly teaches the invention is insufficient to establish anticipation. *Jamesbury Corp. v. Litton Industrial Products, Inc.*, 756 F.2d 1556, 1560, 225 USPQ 253, 256 (Fed. Cir. 1985).

The Examiner points to Column 7, lines 1-42 as anticipating the presently claimed invention. Specifically, the Examiner asserts that the reference discloses a liquefied starch product which appears to be identical to the presently claimed product.

Antrim *et al.* discloses a starch liquefact having a DE of 10.05 but this is achieved only in the presence of 80mM bisulfite. Without the bisulfite a DE is negligible. The current process would produce a starch liquefact having a DE of about 10-12 without the presence of bisulfite. Thus, the products produced by the process are not identical.

Applicants also note that there are other differences in the process used by Antrim *et al.* than used in the present claims. Most notably, Antrim *et al.* readjusts the pH of the starch solution, a step not required (and explicitly recited as such).

Given the strict standards for anticipation, it is readily apparent that there is no anticipation of the claimed invention in view of Antrim *et al.* Withdrawal of the rejection is respectfully requested.

35 U.S.C. §103.

The Examiner has asserted that one of ordinary skill in the art would have expected nominal differences between starch liquefact products based on normal process variations and differences in enzyme batches. See page 3 of the Office Action. Applicants respectfully traverse.

A *prima facie* case of obviousness requires the Examiner to cite to a combination of references which (a) suggests or motivates one of skill in the art to modify their teachings to yield the claimed invention, (b) discloses the elements of the claimed invention, and (c) provides a reasonable expectation of success should the claimed invention be carried out. Failure to establish any one of these

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requirements precludes a finding of a *prima facie* case of obviousness and, without more, entitles Applicants to withdrawal of the rejection of the claims in issue.<sup>1</sup>

As noted above, in order for Antrim *et al.* to achieve a DE of 10.05 the addition of 80 mM bisulfite was necessary; without it the DE was negligible. One skilled in the art would not have been motivated to try a different enzyme under conditions where the result is a negligible DE. Furthermore, the skilled artisan would not have had an expectation of success given the low pH, Antrim's results in the absence of bisulfite and the use of a different enzyme.

The difference between the liquefact and process as disclosed in Antrim *et al.* and the claimed liquefact is not a nominal difference but a significant difference and provides potential improvement beyond the teachings of Antrim *et al.* Thus, Applicant respectfully requests that this rejection be withdrawn and the Claims be passed to allowance.

#### **Rejection under 35 U.S.C. §103 -**

Claims 1, 2, 6-18, 21-34 and 37-51 – 52 as allegedly obvious over the combination of Shetty in view of JP10-136979 (JP '979). Specifically the Examiner asserts the process parameters suggested by Shetty *et al.* "Factors Affecting the Economics of Glucose Production", Delivering Innovation Through Biotechnology", Genencor International, Inc. (1998) (Shetty) as being desirable provide the motivation to the skilled artisan to use the enzyme of JP '979. Applicants respectfully traverse.

As noted above, to establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable

<sup>1</sup> See e.g., *Northern Telecom Inc. v. Datapoint Corp.*, 15 USPQ2d 1321, 1323 (Fed. Cir. 1990); and *In re Dow Chemical Co.*, 837 F.2d 469, 5 USPQ2d 1529 (Fed. Cir.

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expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 493, 20 USPQ2d 1438, 1442 (Fed. Cir. 1991).

Applicants believe that, at best, the Examiner presents an "obvious to try" standard in determining the patentability of the present invention, a standard which has been thoroughly discredited. Although Shetty suggests which parameters it would be desirable to change it gives no indication as to *how* the skilled artisan may be able to achieve the desired results. In order to establish a *prima facie* case of obviousness the reference must provide sufficient basis for the required expectation of success; this is completely lacking in Shetty. Moreover, Applicants note that the process described by Shetty and JP '979 is not the same as that presently claimed by the Applicants.

Recognizing one of the deficiencies of Shetty, the Examiner has cited JP10-136979 as teaching the *Bacillus acidocaldarius* (KTSM #2037) which is included in the instant claims. However, it is submitted that JP 10-136979 in combination with Shetty does not suggest to one skilled in the art that alpha amylase obtained from *Bacillus acidocaldarius* (KTSM #2037) could be used in a liquefaction process wherein a DE of about 10 – 12 is obtained within 60 to 75 minutes of adding the alpha amylase nor that the pH of the starch solution would not have to be adjusted prior to or after the addition of the alpha amylase to be useful for saccharification. *In fact, the English translation of JP '979 kindly provided by the Examiner at paragraph [0063] that the alpha-amylase is added after the slurry's pH is adjusted to 4.5.* As stated repeatedly in the present disclosure, the liquefaction step does not require pH adjustment of the starch slurry prior to enzymatic liquefaction (see, for example, page 3, lines 13-14) and further less time is required to produce a liquefact with a commercially acceptable DE value (see page 4, lines 13 – 16 and page 5, lines 13 – 19).

Applicants assert not only is the process patentable over the cited art but also the claimed starch liquefact product is novel and unobvious over the cited art. Withdrawal of the rejection is respectfully requested.

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1988).

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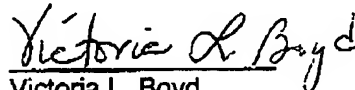
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**CONCLUSION**

In light of the above amendments, as well as the remarks, the Applicants believe the pending claims are in condition for allowance and issuance of a formal Notice of Allowance at an early date is respectfully requested. If a telephone conference would expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (650) 846-7615.

Respectfully submitted,  
GENENCOR INTL., INC.



Victoria L. Boyd  
Registration No. 43,510

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Genencor International, Inc.  
925 Page Mill Road  
Palo Alto, CA 94304  
Tel: 650-846-7615  
Fax: 650-845-6504

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